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(54) AUXILIARY INSTRUMENT FOR FIXING ROD

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(52) **U.S. Cl.** **606/103**

(57) **ABSTRACT**

An auxiliary instrument for fixing a rod places a detent pin on a head portion of the screw. The auxiliary instrument comprises an inner cylinder, an outer cylinder, a first lever and a second lever. The inner cylinder has a plurality of claw portions and an opening employed to introduce the detent pin into an interior thereof. The outer cylinder is arranged to surround the inner cylinder and has a claw pressing portion. The first lever is rotatably connected to the inner cylinder and arranged in substantially perpendicular to an axial direction of the inner cylinder. The second lever is rotatably connected to the fist lever and the outer cylinder and arranged in substantially perpendicular to an axial direction of the outer cylinder. When the first and second levers are operated, the claw portions are pressed inward by the claw pressing portion to hold the head portion of the screw.

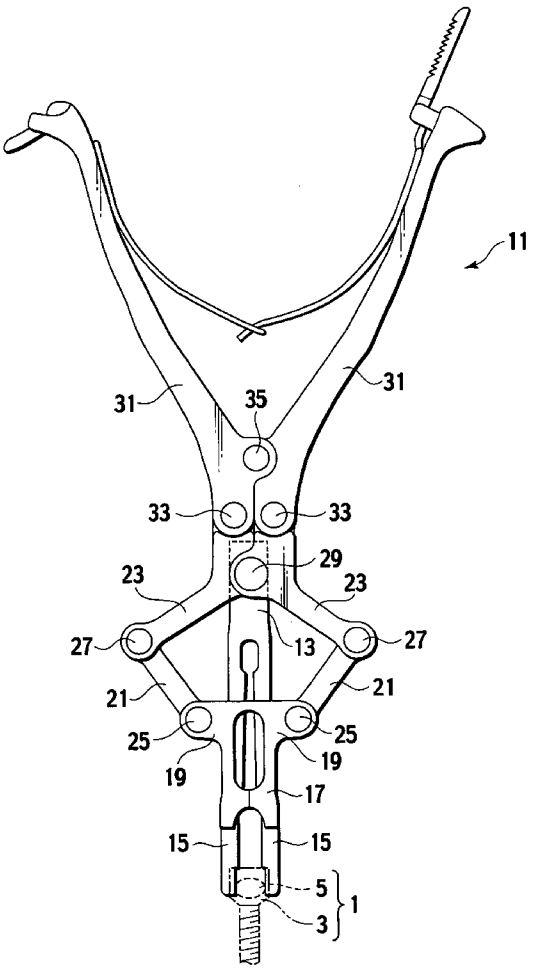


FIG. 1

PRIOR ART

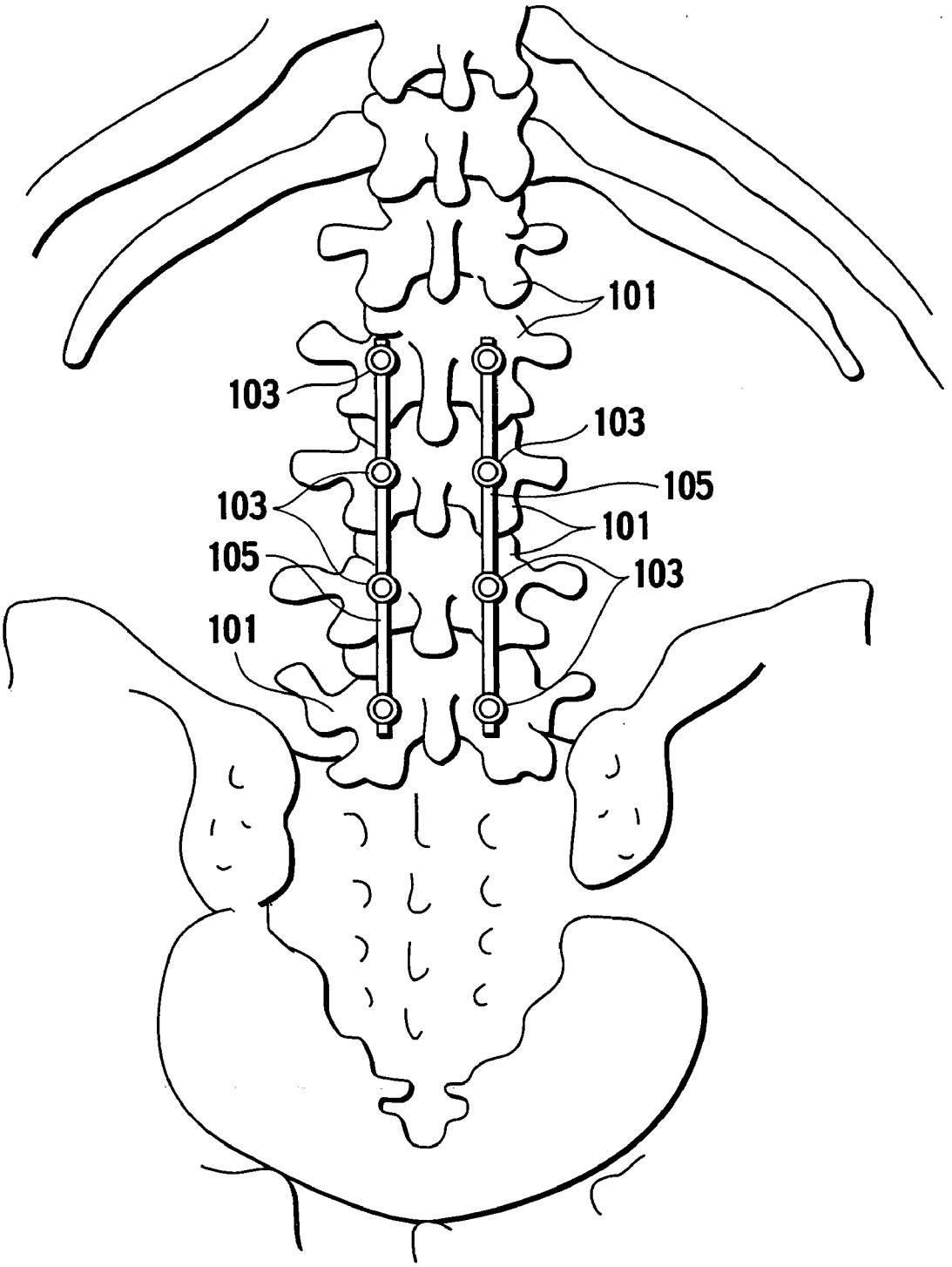


FIG.2

PRIOR ART

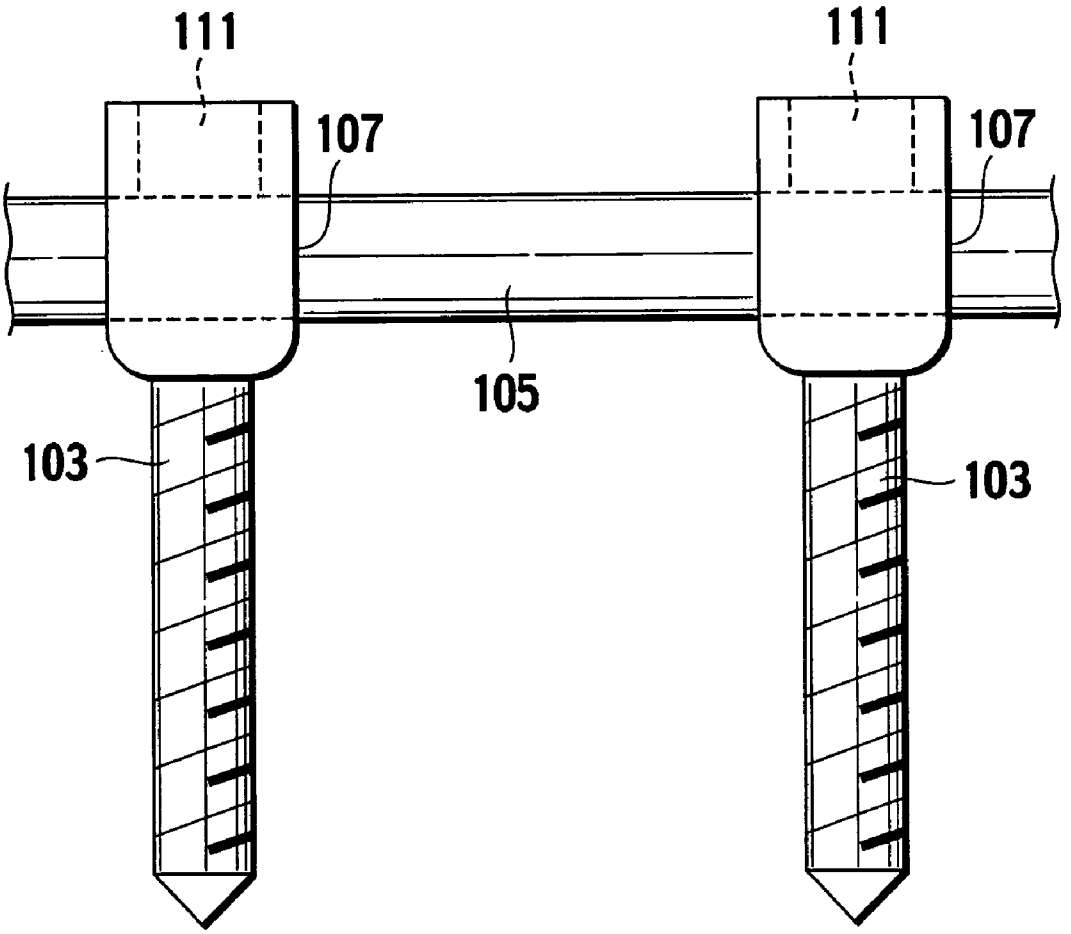


FIG.3

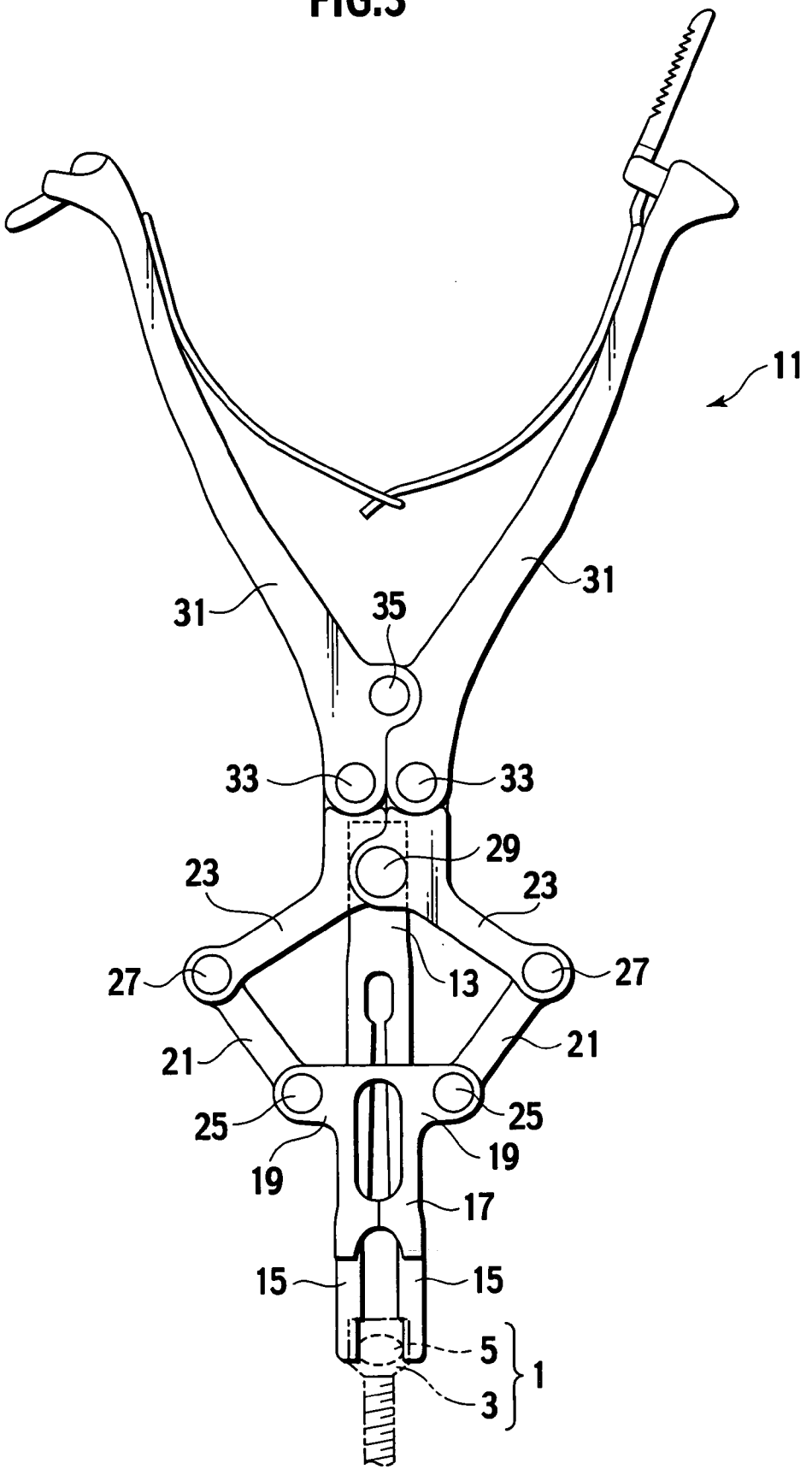


FIG.4

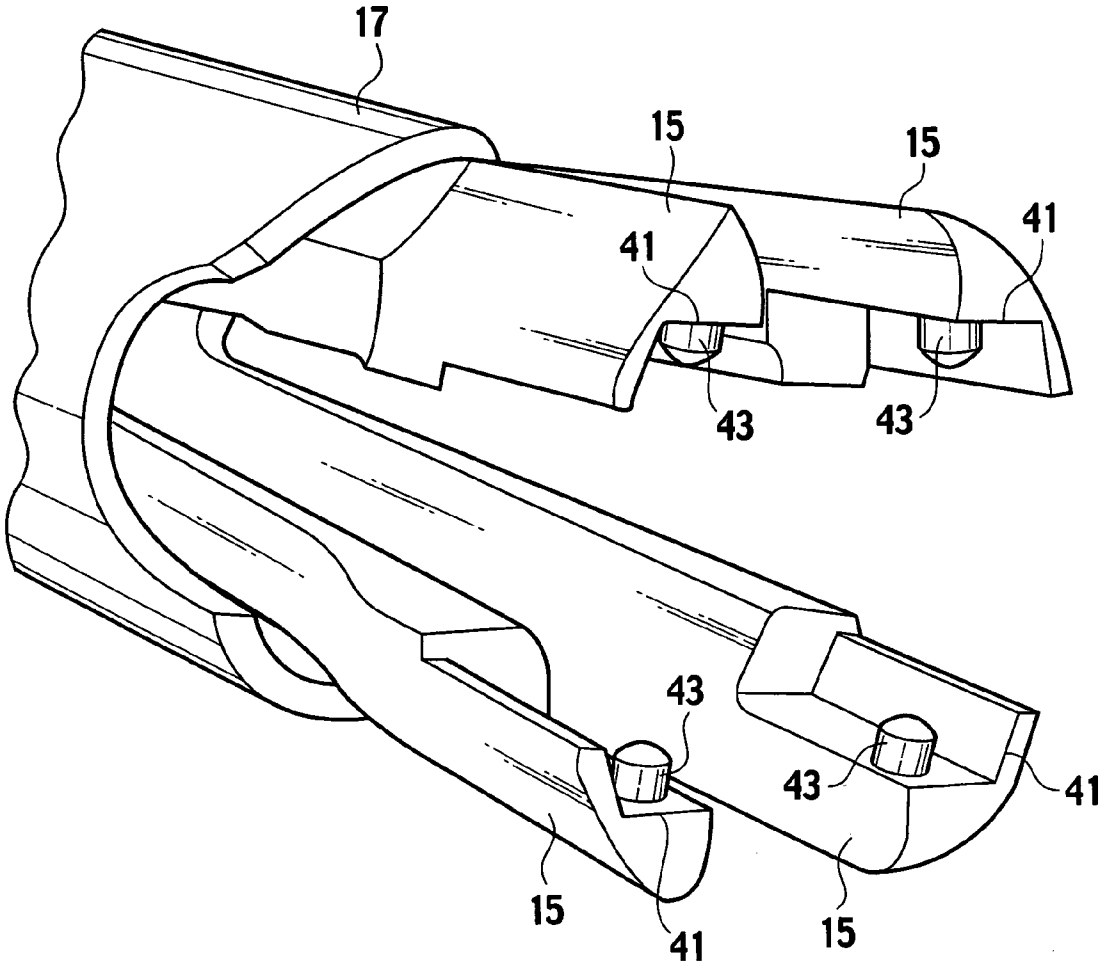


FIG.5

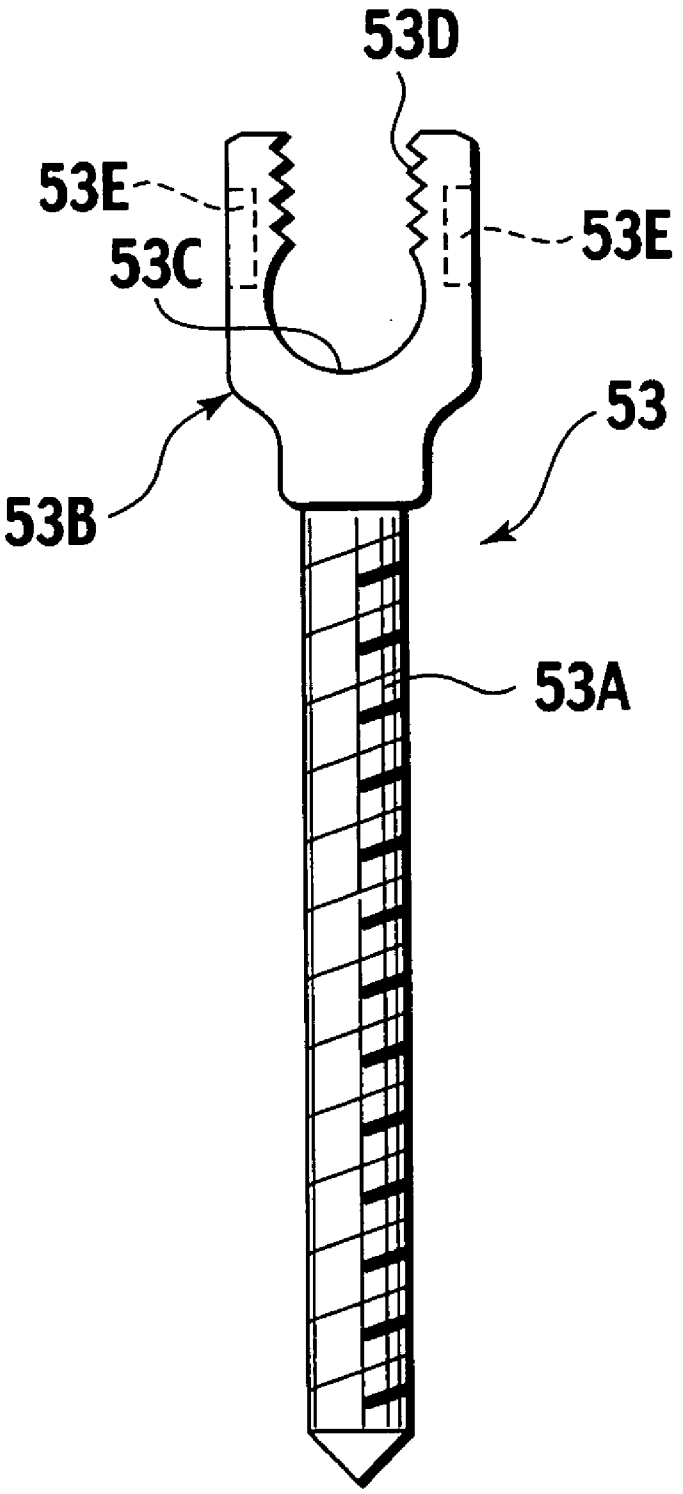


FIG.6

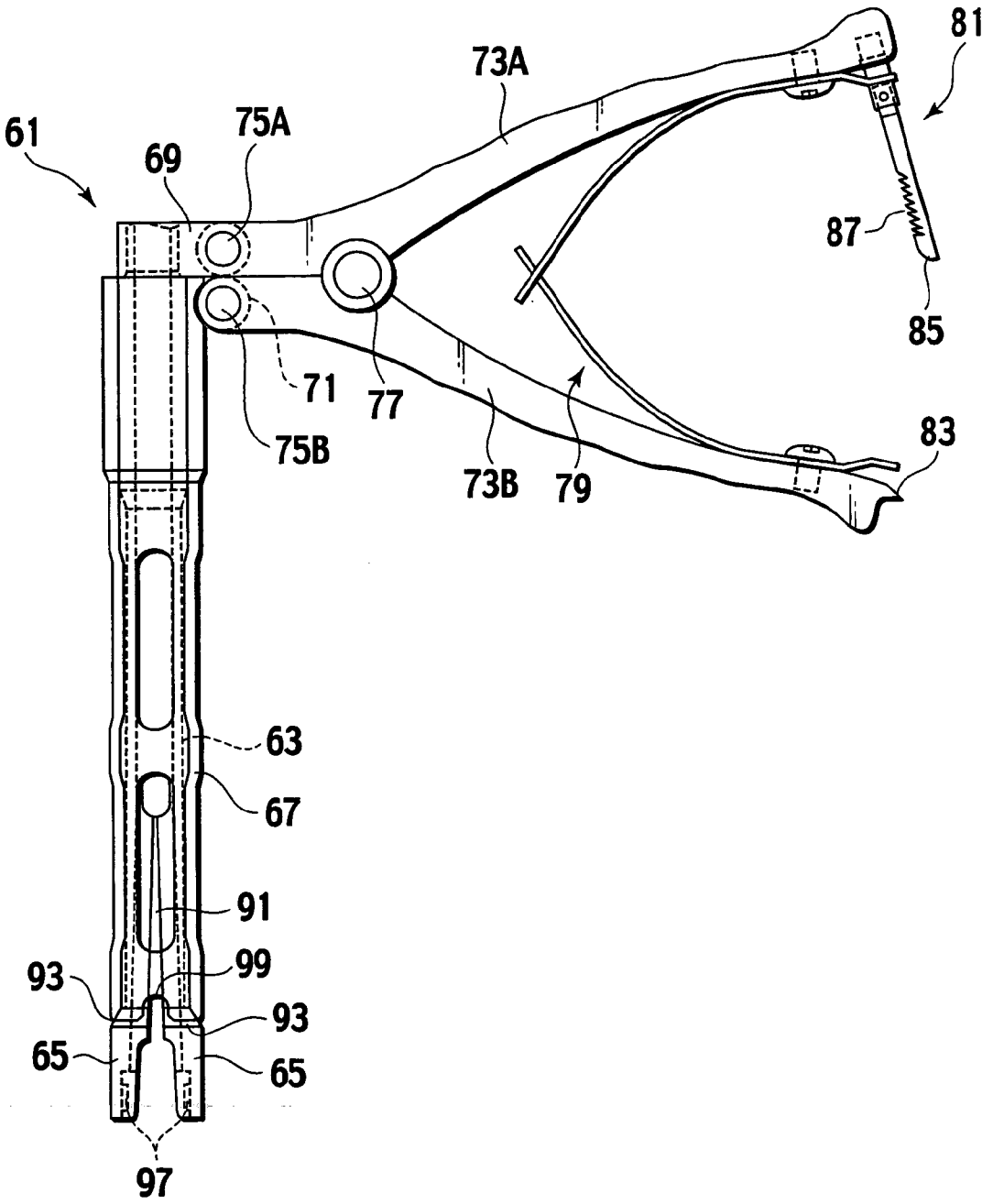


FIG.7

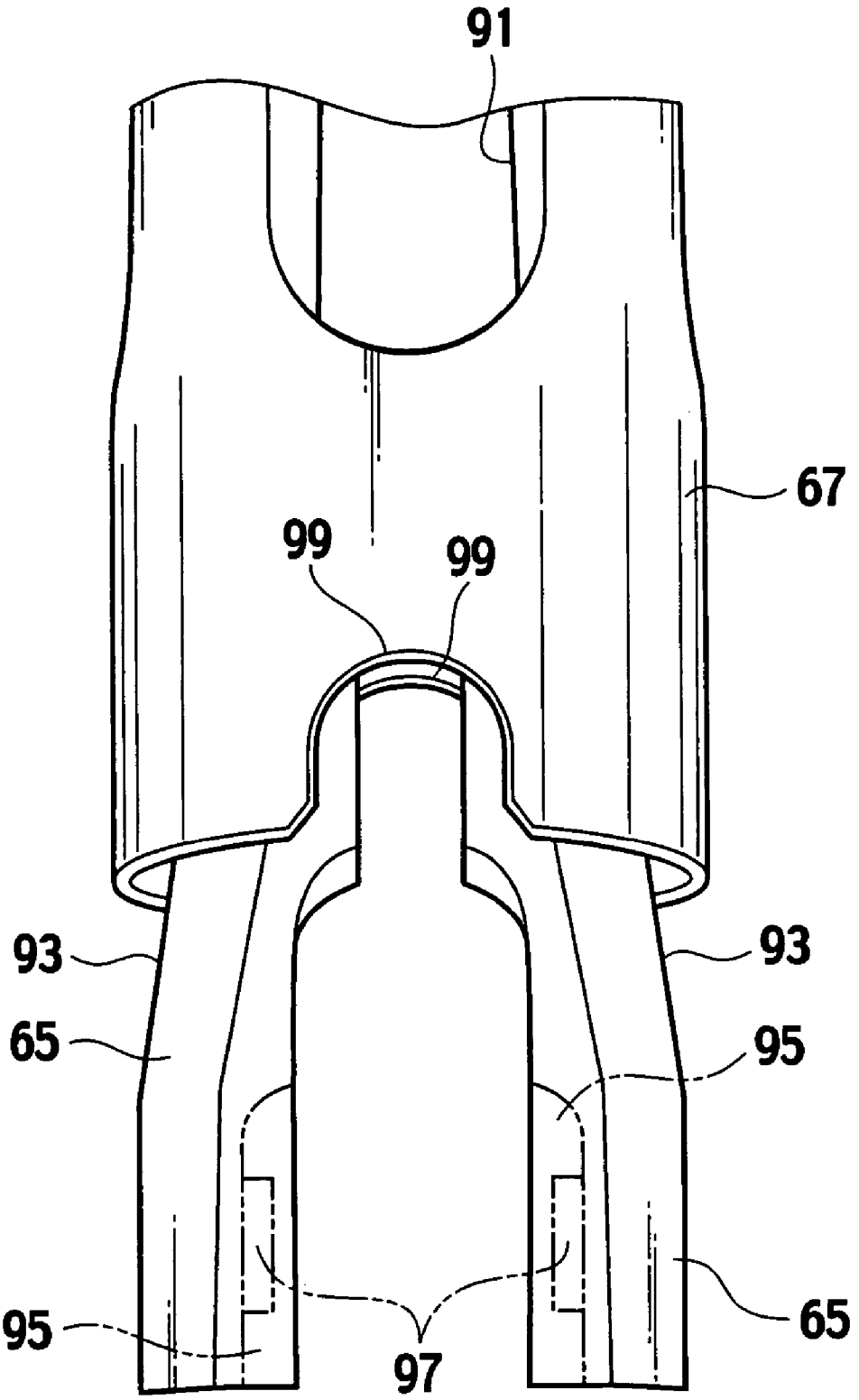


FIG.8B

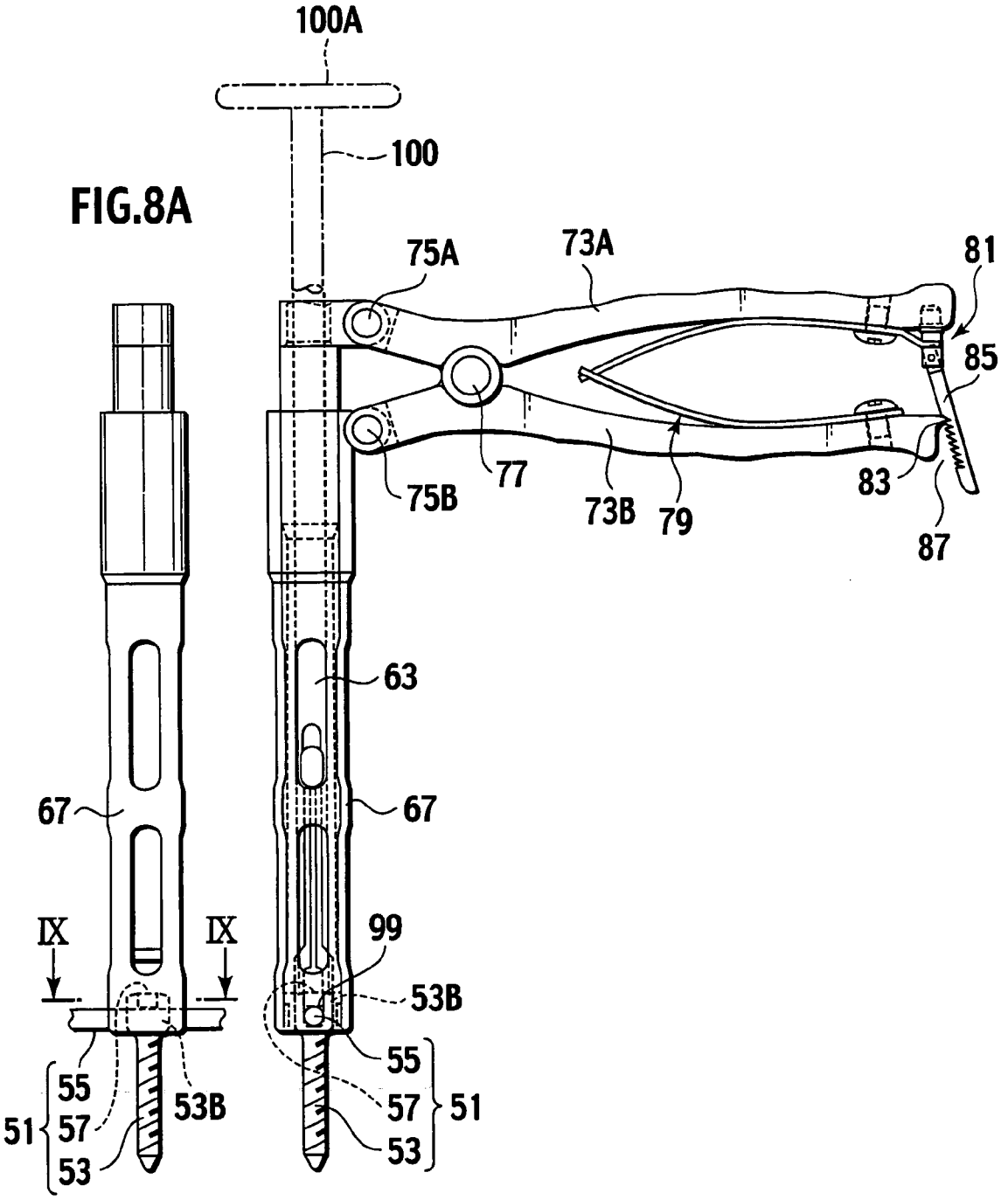

100A
100
75A
73A
81
85
75B
77
73B
79
83
87
63
67
67
IX
IX
99
53B
55
57
53
51
55
57
53
53B
51

FIG.8A

FIG.9

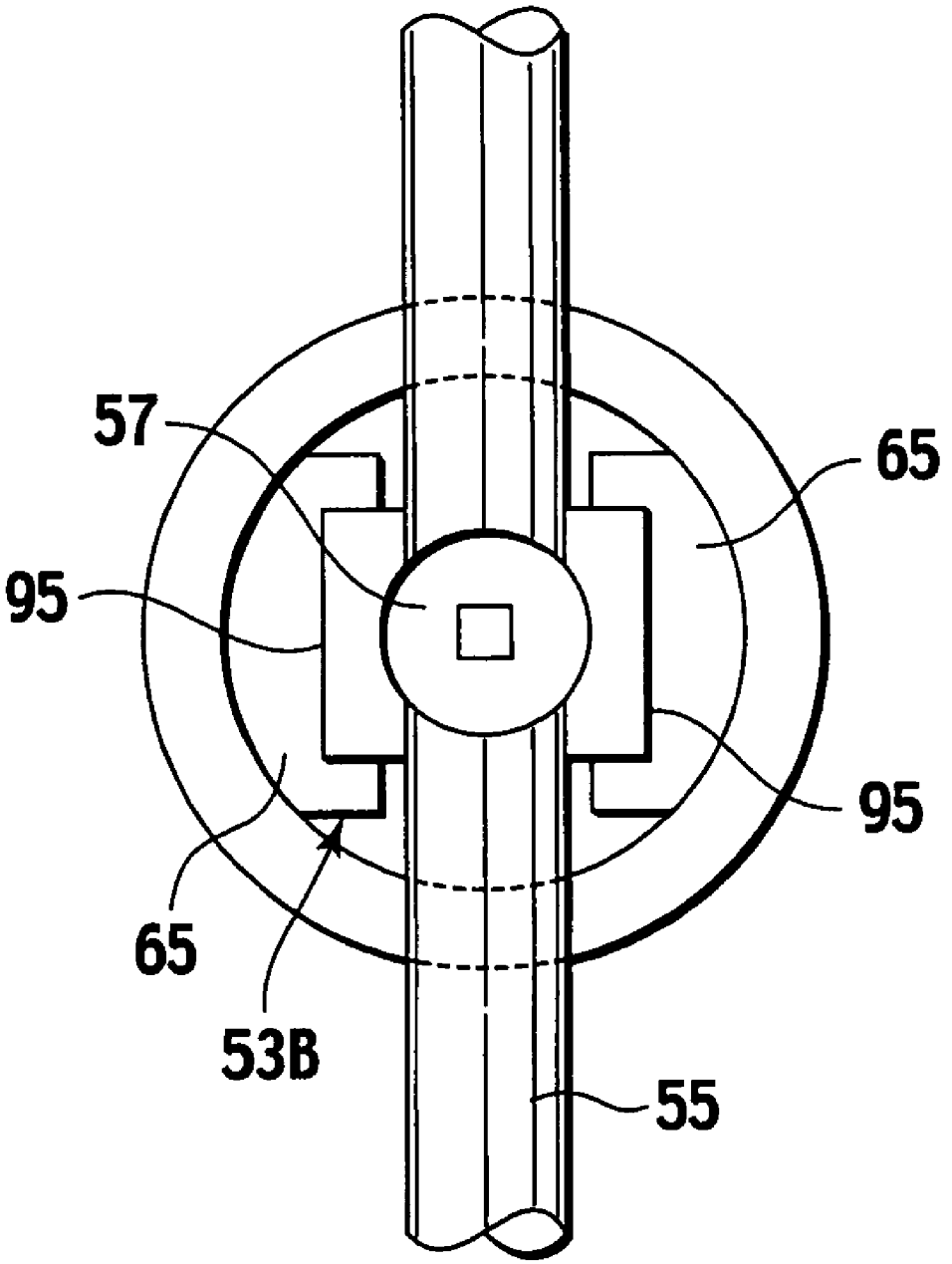


FIG.10B

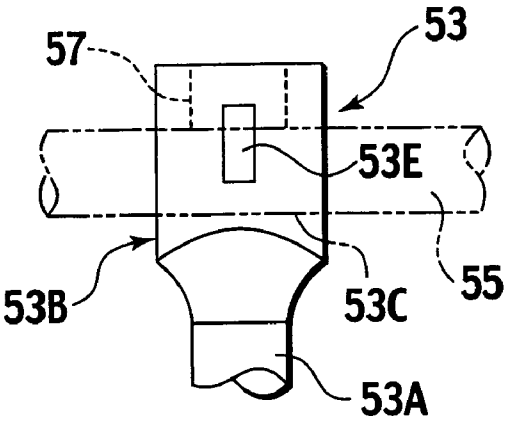


FIG.10A

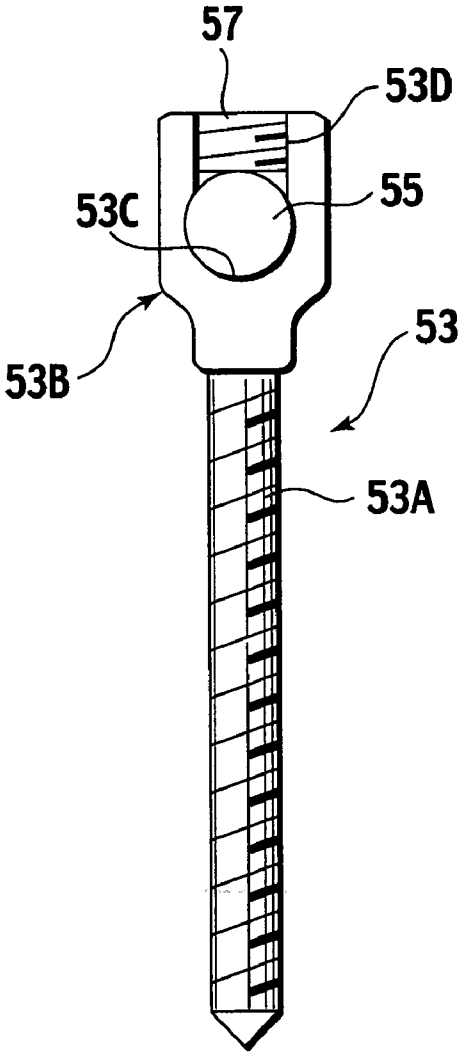
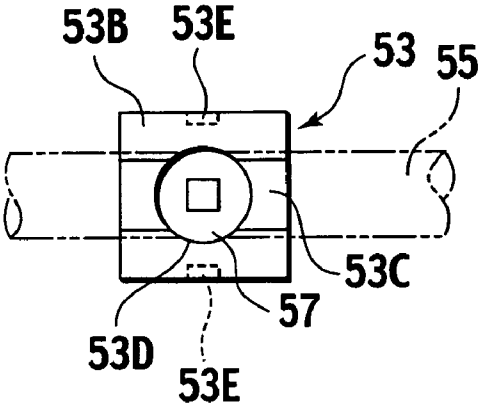


FIG.10C



AUXILIARY INSTRUMENT FOR FIXING ROD

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application claims benefit of priority under 35 U.S.C. § 119 to Japanese Patent Application No. 2004-66311, filed on Mar. 9, 2004, the entire contents of which are incorporated by reference herein.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to an auxiliary instrument for fixing a rod, which connects bones such as thoracic vertebrae or lumbar vertebrae, in engaging grooves which each is formed on a head portion of an implant (a screw) screwed into the bone.

[0004] 2. Description of the Related Art

[0005] In a conventional bone connector, as shown in **FIGS. 1 and 2**, a vertebral body **101** is integrally connected to an adjacent vertebral body **101** by screwing implants (screws) **103** into the vertebral bodies **101** and then fixing a rod **105** to head portions of the screws **103**.

[0006] A work for fixing the rod **105** to each of the screws **103** will be described in detail below. Firstly, the rod **105** passes through an engaging groove **107** formed on the head portion of the screw **103**. Secondly, a detent pin **111** is placed on an upper surface of the engaging groove **107**. Finally, the detent pin **111** is screwed into the engaging groove **107** by means of a tool for rotating the detent pin **111**. Here, a male thread portion and a female thread portion are formed on an outer surface of the detent pin **111** and an upper part of an inner surface of the engaging groove **107**, respectively.

[0007] In the above fixing work, if the detent pin **111** wobbles, it becomes harder to screw the detent pin **111** into the engaging groove **107**. Further, if the detent pin **111** is dropped from the engaging groove **107**, it is possible to hurt an incision part of a patient.

SUMMARY OF THE INVENTION

[0008] An object of the present invention is to provide an auxiliary instrument for fixing a rod capable of easily and stably screwing a detent pin into an engaging groove when the rod is fixed to an implant.

[0009] In order to achieve the above object, the present invention provides an auxiliary instrument for fixing a rod, the auxiliary instrument placing a detent pin employed to fix the rod to a screw on a head portion of the screw comprising: an inner cylinder having a plurality of claw portions at a first end portion thereof and an opening employed to introduce the detent pin into an interior thereof at a second end portion thereof; an outer cylinder arranged to surround the inner cylinder and having a claw pressing portion at a first end portion thereof; a first lever rotatably connected to the second end portion of the inner cylinder and arranged in substantially perpendicular to an axial direction of the inner cylinder; and a second lever rotatably connected to the first lever and a second end portion of the outer cylinder and arranged in substantially perpendicular to an axial direction of the outer cylinder, wherein the claw portions are pressed inward by the claw pressing portion to hold the head portion of the screw when the first lever and the second lever are operated.

[0010] According to the present invention, the auxiliary instrument prevents the detent pin from wobbling because the inner cylinder accommodates the detent pin at a time of screwing the detent screw into an engaging groove formed on the head portion of the screw. It therefore becomes easier to screw the detent pin into the engaging groove. The auxiliary instrument further prevents the detent pin from falling from the engaging groove because the inner cylinder accommodates the detent pin at the time of screwing the detent pin into the engaging groove. It is therefore not possible to hurt an incision part of a patient.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] **FIG. 1** is a plan view of a conventional bone connector in a state of fixing a rod to a screw.

[0012] **FIG. 2** is a side view of the conventional bone connector in the state of fixing the rod to the screw.

[0013] **FIG. 3** is a front view of an auxiliary instrument for fixing a rod according to a first embodiment of the present invention.

[0014] **FIG. 4** is an enlarged perspective view of a lower portion of the auxiliary instrument for fixing a rod according to the first embodiment of the present invention.

[0015] **FIG. 5** is a front view of a screw employed in a second embodiment of the present invention.

[0016] **FIG. 6** is a front view of an auxiliary instrument for fixing a rod according to the second embodiment of the present invention.

[0017] **FIG. 7** is an enlarged perspective view of a lower portion of the auxiliary instrument for fixing a rod according to the second embodiment of the present invention.

[0018] **FIG. 8A** is a side view of the auxiliary instrument for fixing a rod according to the second embodiment of the present invention, in a state of sandwiching a head portion of the screw between claw portions of the auxiliary instrument.

[0019] **FIG. 8B** is a front view of the auxiliary instrument for fixing a rod according to the second embodiment of the present invention, in a state of sandwiching the head portion of the screw between the claw portions of the auxiliary instrument and inserting a rotating tool into the auxiliary instrument.

[0020] **FIG. 9** is a cross-section view of the auxiliary instrument for fixing a rod along the line IX-IX in **FIG. 8A**.

[0021] **FIG. 10A** is a front view of a bone connector in a state of fixing a rod to the screw.

[0022] **FIG. 10B** is a side view of a main portion of the bone connector in the state of fixing the rod to the screw.

[0023] **FIG. 10C** is a plan view of the main portion of the bone connector in the state of fixing the rod to the screw.

DESCRIPTION OF THE PREFFERED EMBODIMENT

First Embodiment

[0024] A bone connector **1** comprises implants (screws) **3**, a rod **5** and a detent pin (not shown). An engaging groove

(not shown) is formed on a square head portion of the screw **3**. The rod **5** passes through a lower portion of the engaging groove.

[**0025**] As shown in **FIGS. 3 and 4**, an auxiliary instrument for fixing a rod **11** comprises an inner cylinder **13**, claw portions **15**, **15**, **15**, **15**, an outer cylinder **17**, brackets **19**, **19**, first links **21**, **21**, second links **23**, **23**, first hinge pins **25**, **25**, second hinge pins **27**, **27**, a first pivot **29**, levers **31**, **31**, third hinge pins **33**, **33** and a second pivot **35**.

[**0026**] The inner cylinder **13** branches in four directions as gently inclining outward from the vicinity of a center portion thereof. The inner cylinder **13** further has the claw portions **15**, **15**, **15**, **15** at distal ends of branch parts thereof (a lower end of the inner cylinder **13**). The head portion of the screw **3** is sandwiched between the claw portions **15**, **15**, **15**, **15**. The outer cylinder **17** is arranged concentrically with the inner cylinder **13**. The outer cylinder **17** further is able to move along an axial direction of the inner cylinder **13**. If the outer cylinder **17** moves down relative to the inner cylinder **13**, the claw portions **15**, **15**, **15**, **15** approach one another as guided by an inner circumference surface of the outer cylinder **17**. The brackets **19**, **19** are mounted symmetrically on both sides of an upper portion of the outer cylinder **17**. The brackets **19**, **19** are extended from the outer cylinder **17** in a direction perpendicular to an axial direction of the rod **5**.

[**0027**] The first links **21**, **21** are rotatably linked to the brackets **19**, **19** via the first hinge pins **25**, **25** at first end portions thereof, respectively. The first links **21**, **21** further are rotatably linked to first end portions of the bellcrank second links **23**, **23** via the second hinge pins **27**, **27** at second end portions thereof, respectively. The second links **23**, **23** are rotatably linked to base end portions of the levers **31**, **31** via the third hinge pins **33**, **33** at second end portions thereof, respectively. The first hinge pins **25**, **25**, the second hinge pins **27**, **27** and the third hinge pins **33**, **33** are arranged in parallel to the axial direction of the rod **5**.

[**0028**] The second links **23**, **23** are connected each other via the first pivot **29** so as to be able to swing. The inner cylinder **13** is supported by means of the first pivot **29** at one end of the first pivot **29** via a bracket integrally mounted on an upper portion of the inner cylinder **13**. The levers **31**, **31** are connected each other via the second pivot **35** so as to be able to swing. Free end portions of the levers **31**, **31** are extended so at to separate from each other.

[**0029**] Grooves **41**, **41**, **41**, **41** are formed on inner surfaces of the claw portions **15**, **15**, **15**, **15** so as to fit into shapes of four corners of the head portion of the screw **3**. Engaging pins **43**, **43**, **43**, **43** are provided in a protruding condition on inner surfaces of the grooves **41**, **41**, **41**, **41**. When the claw portions **15**, **15**, **15**, **15** approach one another by moving the outer cylinder **17** down relative to the inner cylinder **13**, the engaging pins **43**, **43**, **43**, **43** are inserted into engaging holes (not shown) formed on the head portion of the screw **3**.

[**0030**] A work for fixing the rod **5** to the screw **3** by means of the auxiliary instrument **11** will be described in detail below. Firstly, the rod **5** passes through the lower portion of the engaging groove formed on the head portion of the screw **3**. Secondly, the four corners of the head portion of the screw **3** are inserted into the grooves **41**, **41**, **41**, **41** of the auxiliary instrument **11**. Thirdly, the engaging pins **43**, **43**, **43**, **43** of the auxiliary instrument **11** are inserted into the engaging holes of the screw **3** by operating the levers **31**, **31**.

[**0031**] The operation of the levers **31**, **31** will be described in detail below. An operator holds the levers **31**, **31** in his/her one hand to bring the free end portions of the levers **31**, **31** close to each other, which allows the base end portions of the levers **31**, **31** to separate from each other. Thereby, the first end portions of the second links **23**, **23** approach each other. The first links **21**, **21** move the outer cylinder **17** down relative to the inner cylinder **13** via the brackets **19**, **19**, as the first end portions of the second links **23**, **23** approach each other. When the outer cylinder **17** presses the claw portions **15**, **15**, **15**, **15** inward via the inner circumference surface thereof, the claw portions **15**, **15**, **15**, **15** approach one another. Thereby, the engaging pins **43**, **43**, **43**, **43** of the auxiliary instrument **11** are inserted the engaging holes of the screw **3**.

[**0032**] Fourthly, when the detent pin is dropped from an opening surface of the upper portion of the inner cylinder **13**, the detent pin is guided by an inner circumference surface of the inner cylinder **13** and then placed on an upper surface of the engaging groove. Finally, a tool for rotating the detent pin is inserted from the opening surface of the upper portion of the inner cylinder **13** and a lower end portion of the tool is engaged to a tool engaging hole formed on an upper surface of the detent pin. Then, the detent pin is screwed into the engaging groove by rotating the tool.

[**0033**] Features of the auxiliary instrument **11** will be described below.

[**0034**] The auxiliary instrument **11** prevents the detent pin from wobbling because the inner cylinder **13** accommodates the detent pin at the time of screwing the detent pin into the engaging groove. Therefore, it becomes easier to screw the detent pin into the engaging groove.

[**0035**] The auxiliary instrument **11** prevents the detent pin from falling from the engaging groove because the inner cylinder **13** accommodates the detent pin at the time of screwing the detent pin into the engaging groove. Therefore, it is not possible to hurt an incision part of a patient.

Second Embodiment

[**0036**] A bone connector **51** comprises implants (screws) **53**, a rod **55** and a detent pin **57** (see **FIG. 8A**). The screw **53** is screwed into a vertebral body such as a thoracic vertebra and a lumbar vertebra. The rod **55** connects a plurality of screws **53** one another. The detent pin **57** fixes the rod **55** to each of the screws **53**.

[**0037**] As shown in **FIG. 5**, the screw **53** has a thread portion **53**A, a head portion **53**B, an engaging groove **53**C, a female thread portion **53**D and engaging holes **53**E, **53**E. The thread portion **53**A to be screwed into the vertebral body is formed at a lower part of the screw **53**. The square head portion **53**B is formed at an upper part of the screw **53**. The engaging groove **53**C is formed at a center part of the head portion **53**B. The rod **55** passes through a lower portion of the engaging groove **53**C. The female thread portion **53**D is formed on an upper part of an inner surface of the engaging groove **53**C. A male thread portion (not shown) formed on an outer surface of the detent pin **57** is screwed into the

female thread portion **53**D. The engaging holes **53**E, **53**E are formed on an outer surface of the head portion **53**B so as to be opposed to each other.

[**0038**] As shown in **FIG. 6**, an auxiliary instrument for fixing a rod **61** comprises an inner cylinder **63**, claw portions **65**, **65**, an outer cylinder **67**, a first bracket **69**, a second bracket **71**, levers **73**A, **73**B, hinge pins **75**A, **75**B, a pivot **77**, a biasing means **79** and a locking means **81**.

[**0039**] The inner cylinder **63** branches in two directions as gently inclining outward from the vicinity of a center portion thereof. The inner cylinder **63** further has the claw portions **65**, **65** at distal ends of branch parts thereof (a lower end of the inner cylinder **63**). The head portion **53**B of the screw **53** is sandwiched between the claw portions **65**, **65**. The outer cylinder **67** is arranged concentrically with the inner cylinder **63** and shorter than the inner cylinder **63**. The outer cylinder **67** further is able to move along an axial direction of the inner cylinder **63**. If the outer cylinder **67** moves down relative to the inner cylinder **63**, the claw portions **65**, **65** approach each other as guided by an inner circumference surface of the outer cylinder **67**. The first bracket **69** is integrally mounted on an upper end portion of the inner cylinder **63** projecting upward from an upper end face of the outer cylinder **67**. The second bracket **71** is integrally mounted on an upper end portion of the outer cylinder **67**.

[**0040**] The levers **73**A, **73**B are employed to move the outer cylinder **67** along the axial direction of the inner cylinder **63**. The levers **73**A, **73**B are connected to the first bracket **69** and the second bracket **71** via the hinge pins **75**A, **75**B, respectively. More specifically, base end portions of the levers **73**A, **73**B are supported to the first bracket **69** and the second bracket **71** via the hinge pins **75**A, **75**B, respectively so that the levers **73**A, **73**B may pivot. The levers **73**A, **73**B are further connected each other via the pivot **77** so as to be able to swing at a position close to the end portions thereof.

[**0041**] The biasing means **79** is a leaf spring for biasing the levers **73**A, **73**B so as to bring the base end portions of the levers **73**A, **73**B close to each other. The biasing means **79** is mounted between the levers **73**A, **73**B. The biasing means **79** may be a means for biasing the lever **73**A, **73**B so as to bring the base end portions of the levers **73**A, **73**B close to each other without being limited to the leaf spring.

[**0042**] The locking means **81** is a means for holding a status where the base end portions of the levers **73**A, **73**B separates from each other against biasing force of the biasing means **79**. The locking means **81** is mounted to free end portions of the levers **73**A, **73**B. The locking means **81** has a catching claw **83**, a hold lever **85** and a caught portion **87**. The catching claw **83** is mounted to the free end portion of the lever **73**B. The hold lever **85** is mounted to the free end portion of the lever **73**A and has the caught portion **87** to which the catching claw **83** is engaged.

[**0043**] Structure of a lower end portion of the inner cylinder **63** will be described in detail below. As shown in **FIG. 7**, in a situation where the auxiliary instrument **61** is unemployed, the inner cylinder **63** has a part projecting from a lower end face of the outer cylinder **67** at the lower end portion thereof. The claw portions **65**, **65** are formed at the projecting part. A slit **91** is formed in the vicinity of the center portion of the inner cylinder **63** so as to divide the lower end portion of the inner cylinder **63** into two parts. Taper faces **93**, **93** are formed on an outer circumference surface of the claw portions **65**, **65** so as to gently incline outward. If the outer cylinder **67** moves down relative to the inner cylinder **63**, the taper faces **93**, **93** are pressed inward by the inner circumference surface of the outer cylinder **67**.

[**0044**] Grooves **95**, **95** are formed on inner surfaces of the claw portions **65**, **65** so as to each be substantially shaped like a letter U in the cross-section view thereof and be fitted into a shape of a rising portion in the head portion **53**B of the screw **53** (see **FIG. 9**). Engaging pins **97**, **97** are provided in a protruding condition on inner surfaces of the grooves **95**, **95**. When the claw portions **65**, **65** approach each other by moving the outer cylinder **67** down relative to the inner cylinder **63**, the engaging pins **97**, **97** are inserted into the engaged holes **53**E, **53**E formed on the head portion **53**B of the screw **53**. Rod holding portions **99**, **99** are formed at a center area of the lower end portion of the outer cylinder **67** so as to be substantially shaped like a half circular arc. From above, the rod holding portions **99**, **99** hold down the rod **55** which passes through the lower portion of the engaging groove **53**C of the screw **53**.

[**0045**] A work for fixing the rod **55** to the screw **53** by means of the auxiliary instrument **61** will be described in detail below. Firstly, the rod **55** passes through the lower portion of the engaging groove **53**C formed on the head portion **53**B of the screw **53**. Secondly, a pair of the rising portions in the head portion **53**B of the screw **53** are inserted into the grooves **95**, **95** of the auxiliary instrument **61**. Thirdly, the engaging pins **97**, **97** of the auxiliary instrument **61** are inserted into the engaging holes **53**E, **53**E of the screw **53** by operating the levers **73**A, **73**B (see **FIG. 8A**).

[**0046**] The operation of the levers **73**A, **73**B will be described in detail below. An operator holds the levers **73**A, **73**B in his/her one hand to bring the free end portions of the levers **73**A, **73**B close to each other against biasing force of the biasing means **79**, which allows the base end portions of the levers **73**A, **73**B to separate from each other.

[**0047**] Clearances are formed between the inner cylinder **63** and the outer cylinder **67**, between the lever **73**A and the hinge pin **75**A, between the lever **73**B and the hinge pin **75**B, between the lever **73**A and the pivot **77** and between the lever **73**B and the pivot **77**. A locus error, which is generated between arc movements of the base end portions of the levers **73**A, **73**B and line movements of the inner cylinder **63** and the outer cylinder **67** when the base end portions of the levers **73**A, **73**B separate from each other, is absorbed by these clearances.

[**0048**] When the base end portion of the levers **73**A, **73**B separate from each other, the taper faces **93**, **93** of the claw portions **65**, **65** are pressed inward by the inner circumference surface of the outer cylinder **67**, which allows the engaging pins **97**, **97** to be slightly inserted into the engaging holes **53**E, **53**E. In a case where the engaging pins **97**, **97** are not inserted into the engaging holes **53**E, **53**E, the operator moves the inner cylinder **63** relative to the head portion **53**B of the screw **53** upward or downward by operating the levers **73**A, **73**B, which allows the engaging pins **97**, **97** to be slightly inserted into the engaging holes **53**E, **53**E.

[**0049**] When the operator further holds the levers **73**A, **73**B tightly in his/her one hand, the outer cylinder **67** moves downward relative to the inner cylinder **63**, which allows the

rod holding portions **99**, **99** to hold the rod **55** down from above in a situation where the engaging pins **97**, **97** are engaged into the engaging holes **53**E, **53**E. Then, a situation where the rod holding portions **99**, **99** presses the rod **55** toward a bottom portion of the engaging groove **53**C is held by engaging the catching portion **83** to the caught portion **87** of the hold lever **85** in the locking means **81** (see **FIG. 8B**).

[**0050**] Reactive force, which is generated when the rod **55** is pressed toward the bottom portion of the engaging groove **53**C, is transmitted to the inner cylinder **63** via the outer cylinder **67**, the lever **73**A, the pivot **77** and lever **73**B. However, an engagement of the engaging pins **97**, **97** and the engaging holes **53**E, **53**E prevents the screw **53** from pulling out the vertebra body. Therefore, the rod **55** is steadily pressed toward the bottom portion of the engaging groove **53**C by the rod holding portions **99**, **99**.

[**0051**] Fourthly, when the detent pin **57** is dropped from an opening surface of the upper portion of the inner cylinder **63**, the detent pin **57** is guided by an inner circumference surface of the inner cylinder **63** and then placed on an upper surface of the engaging groove **53**C. Finally, a rotating tool **100** is inserted from the opening surface of the upper portion of the inner cylinder **63** and a lower end portion of the tool **100** is engaged to a polygonal tool engaging hole formed on an upper surface of the detent pin **57**. Then, the operator holds a handle **100**A of the tool **100** in his/her other hand and then screw the male thread portion of the detent pin **57** into the female thread portion **53**D of the engaging groove **53**C by rotating the tool **100**. Thereby, the detent pin **57** presses the rod **55** toward the bottom portion of the engaging groove **53**C (see **FIGS. 10A** to **10**C).

[**0052**] The auxiliary instrument **61** has the following features in addition to the features of the auxiliary instrument **11**.

[**0053**] Structure of the auxiliary instrument **61** is much simpler than that of the auxiliary instrument **11** because the auxiliary instrument **61** comprises the inner cylinder **63**, the claw portions **65**, **65**, the outer cylinder **67**, the first bracket **69**, the second bracket **71**, the levers **73**A, **73**B, the hinge pins **75**A, **75**B, the pivot **77**, the biasing means **79** and the locking means **81**.

[**0054**] The engaging pins **97**, **97** are easily inserted into the engaging holes **53**E, **53**E because each of the rising portions in the head portion **53**B of the screw **53** is restrained from three directions by the groove **95** of the claw portion **65**.

[**0055**] The rod **55** is steadily fixed to the screw **53** by the detent pin **57** because the rod holding portions **99**, **99** press the rod **55** toward the bottom portion of the engaging groove **53**C.

[**0056**] In the auxiliary instrument **11**, it is necessary for an operator who holds the lever **31** in his/her one hand and the rotating tool in his/her other hand to operate the rotating tool in a narrow space, because the rotating tool is arranged in substantially parallel to the lever **31**. Therefore, an operationality of the rotating tool is bad. On the other hand, in the auxiliary instrument **61**, it is necessary for an operator who holds the levers **73**A, **73**B in his/her one hand and the rotating tool **100** in his/her other hand to operate the rotating tool in a large space, because the rotating tool **100** is arranged in substantially perpendicular to the levers **73**A, **73**B. Therefore, an operationality of the rotating tool **100** is improved in comparison with the auxiliary instrument **11**.

[**0057**] In the auxiliary instrument **11**, when an operator holds the lever **31** in his/her one hand and the rotating tool in his/her other hand, the screw **3** may rotate with the rotating tool because the rotating tool is arranged in substantially parallel to the lever **31**. On the other hand, in the auxiliary instrument **61**, when an operator holds the levers **73**A, **73**B in his/her one hand and the rotating tool **100** in his/her other hand, the screw **53** may not rotate with the rotating tool **100** against rotation force of the rotating tool **100** to be easily pressed toward the vertebra body because the rotating tool **100** is arranged in substantially perpendicular to the levers **73**A, **73**B. Therefore, the auxiliary instrument **61** prevents the screw from rotating with the rotating tool in comparison with the auxiliary instrument **11**.

[**0058**] In the auxiliary instrument **11**, it is possible to hurt an incision part of a patient because the second links **23**, **23** moves in a perpendicular direction relative to the axial direction of the rod **5**. On the other hand, in the auxiliary instrument **61**, the auxiliary instrument **61** can reduce volume occupied by a member inserted into the incision part and prevent the incision part from being hurt because there is not any link mechanism in the auxiliary instrument **61**.

What is claimed is:

1. An auxiliary instrument for fixing a rod, the auxiliary instrument placing a detent pin employed to fix the rod to a screw on a head portion of the screw comprising:

an inner cylinder having a plurality of claw portions at a first end portion thereof and an opening employed to introduce the detent pin into an interior thereof at a second end portion thereof;

an outer cylinder arranged to surround the inner cylinder and having a claw pressing portion at a first end portion thereof;

a first lever rotatably connected to the second end portion of the inner cylinder and arranged in substantially perpendicular to an axial direction of the inner cylinder; and

a second lever rotatably connected to the first lever and a second end portion of the outer cylinder and arranged in substantially perpendicular to an axial direction of the outer cylinder,

wherein the claw portions are pressed inward by the claw pressing portion to hold the head portion of the screw when the first lever and the second lever are operated.

2. An auxiliary instrument for fixing a rod according to claim 1, wherein the claw portions approach one another as being guided by the claw pressing portion formed on an inner circumference surface of the outer cylinder when the outer cylinder moves down relative to the inner cylinder.

3. An auxiliary instrument for fixing a rod according to claim 2, wherein the inner cylinder branches in two directions as gently inclining outward from the vicinity of a center portion to the first end portion thereof.

4. An auxiliary instrument for fixing a rod according to claim 3, wherein each of the claw portions has a groove for restraining the head portion of the screw from three directions.

5. An auxiliary instrument for fixing a rod according to claim 4, wherein the groove has an engaging pin to be engaged into an engaging hole formed on the head portion of the screw.

6. An auxiliary instrument for fixing a rod according to claim 3, wherein the outer cylinder has a rod holding portion for pressing the rod toward the head portion of the screw at the first end thereof.

7. An auxiliary instrument for fixing a rod according to claim 1, wherein the first lever and the second lever are connected to the inner cylinder and the outer cylinder via brackets and hinge pins, respectively.

8. An auxiliary instrument for fixing a rod according to claim 1, further comprising:

a biasing member mounted between the first lever and the second lever and bringing a base end portion of the first lever close to a base end portion of the second lever.

9. An auxiliary instrument for fixing a rod according to claim 8, further comprising:

a locking member mounted to a free end portion of the first lever and a free end portion of the second lever and holding a situation where the base end portions are separated from each other against biasing force of the biasing member.

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